HOW TO CHOP A CONVERTIBLE TOP

ROD & Custom

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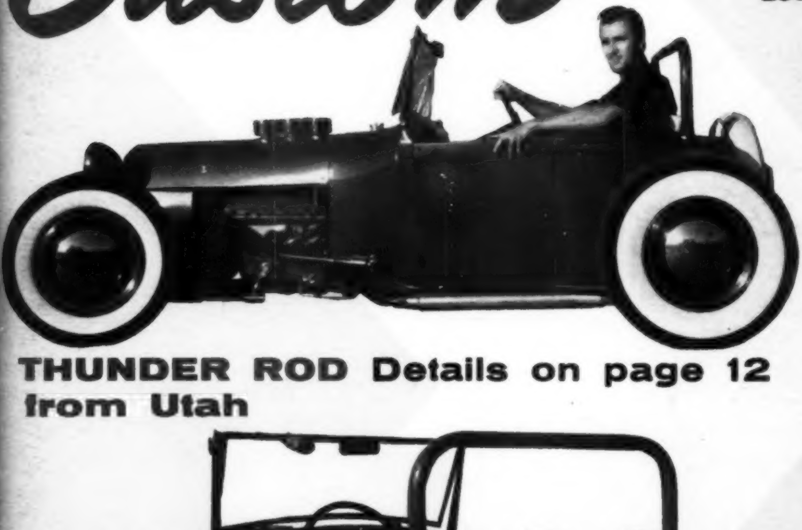
MARCH 1957

25c



THUNDER ROD from Utah

Details on page 12

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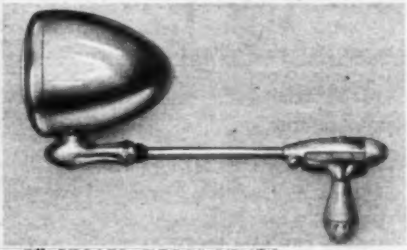

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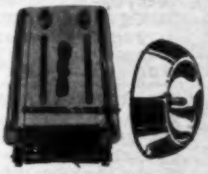

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eleventh issue of our fourth year

MARCH
1957

in this month's

ROD & Custom

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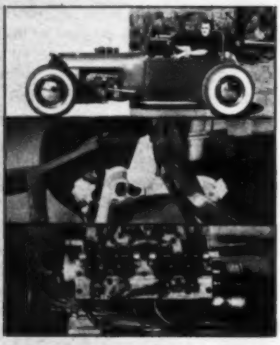
FEATURES



THIS MONTH'S HOW-TO-DO-ITS

RODS AND CUSTOMS

REGULAR DEPARTMENTS

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the starting line

IT SEEMS as though both the rodding and customizing worlds are all shook up over what is turning out to be a real fad. The California Tilt (e.g., the front of a car dragging the ground while the tail is jacked high in the air) has become "the thing to do" whether the car is a dragster intended only for all-out speed or merely a custom of no real value other than sitting prettily in a drive-in. But the letters that pour across our desks tend to indicate that, at the present rate, anyone whose car sits down in back (heaven forbid!) or on an even keel (as the manufacturers intended) should be tarred, feathered and left to await his fate on an abandoned drag strip.

With all the frenzied scurrying to give their cars the downhill look, you'd think one would pause long enough to ask *why?*, or better, *who started it, and why?* But, as luck would have it, no one seems interested in that aspect. So – we'll tell you anyway.

It probably all started during the early years of dry lake racing (in California). As a matter of fact, you can blame it on the first guy who stuffed a couple of large tires on the back of his 4-banger in order to gain a few miles per hour out of his maximum engine rpm's. Maybe he had gone the limit on available rear end ratios, who knows? But anyway, someone undoubtedly followed suit when it was discovered that the first guy's speed really *did* pick up.

Adding to the foregoing conclusions is the cause for switching rear ends. The easily available Model A rear end has probably provided the rear underpinnings of more flat-out machinery than you can shake a con rod at. Thus, with this choice item, and its accompanying high-arch spring, came more tail-high cars. History doesn't record who was first with a q.c. rear end, but whoever it was no doubt discovered he couldn't get his cover plate off (if he used a later-than-A-rear-end). So, an A spring, atop the axle, eliminated his accessibility problem. Under the car he had room to work, outside the car he had the downhill look. Thus, rake became the speed symbol.

Then came the streamliners. During the early streamlined hot rod days, it was correctly ascertained that a low rear end made stability poor, since air piling up between the belly pan and the ground caused a reduction of effective rear wheel weight. So, up went streamliner tails and the forward tilt served another purpose.

Slowly the fad spread to street rods and last *and* least, to customs as the drivers of prettified drive-in bait searched for something new and different to do. In the latter category the California Tilt serves no purpose whatsoever, outside of appearance's sake, other than stopping the flow of money to makers of exhaust tips.

The big question: What's next? First it was *down in the back*, then *make 'er level.* And now, *down in front.* Can you imagine a car lower on *one side* than on the other? ● s.m.

It's a fact, man . . .

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build it yourself at home with TAP's new, low-cost carcrafting kits!

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LETTERS

THE '57 CARS

I took offense at your article on Customizing the '57 Cars in the December issue. The suggestions that Henning & Ritch offered on the Ford, Chevy, Stude, Lincoln, etc., were real crumby. Why can't you people leave well enough alone?

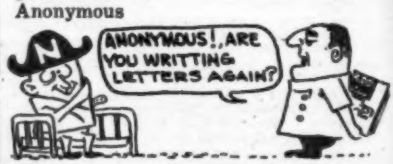
George Malone — Omaha, Neb.

• *We calls 'em the way we sees 'em.*

OH NO, NOT AGAIN!

If there's anything I hate, it's someone who takes credit for another's work. Take this character John Males (Editor's note: John Males, readers, is a changeable character who, 1) hates hot rods, 2) hates customs, 3) keeps writing us letters). For the past several years I've been forced to swallow my pride and let John rant and rave about his likes and dislikes, and to boast about his cars – *WHICH I BUILT!* John has never turned a nut or bolt in all his life (he's 57) and, furthermore, wouldn't know which way to turn one if he did! If John can do it, so can I; I hate Rods and Customs – both of them!! I built those cars only to show my distaste for both factions, then sold them – uncompleted, to the gullible Males.

Anonymous



• *Listen, fellas, R & C is supposed to be used as a meeting place for hot rodders and customizers, a place where ideas and suggestions can be examined and tried. We dislike having to settle arguments, acting as go-between in hassles, or using what little space we have to display crank letters. But, well, we just HAD to show you this. Any comments?*

MODEL CAR CONTEST – AGAIN

Two months ago I entered your Model Car Contest by submitting a reworked miniature '56 Ford. Have seen nothing further about this contest in recent issues and wondered who won, and – *I want my car back!*

Joe Cruzzi San Mateo, Calif.

• *If you can't wait until we return it to you, come on down and get it. Besides, we could save postage that way. Humor aside, next month's issue will reveal the winners, what they submitted in order to win and a host of photos of model cars of every type and description. Entrants will begin receiving their models back soon.*

ARIN CEE

We think it's about time that someone gave Arin Cee a little credit – he's been around for several years but have seen nary a word in your Letters column about him. He (and artist Peter Millar) deserve commendation for great work – for relieving we readers of the monotony of the how-to-do-its that other publications display with drab, uninformative photos. Thank Arin for us for becoming a member of our club, it's an honor to have him in.

THE ROD BENDERS L.A., Calif.

• *Arin and father Millar say thanks to the many clubs and organizations which have invited them to be honorary members. Arin will continue to honor one or more of these clubs in each issue by displaying their club's name and a replica of their car plaques.*

automart

Universal Hydraulic Valve Lifter Remover. Operates on a straight line pull, to eliminate twisting, turning, prying and damage to the lifters. Removes stubborn lifters from top of engine. Inverted collet locks in a snap-ring groove for straight line pull. There is no necessity of pulling the camshaft.

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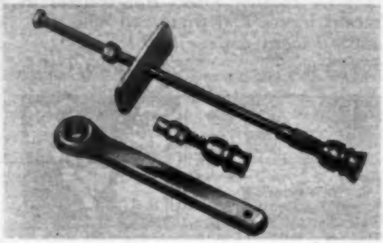

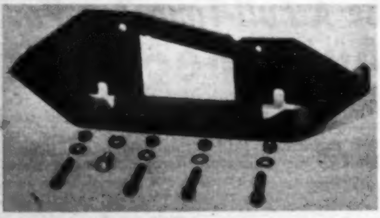

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Robert E. Tomkins, Inc.
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Teardrop spotlights, almost impossible to find in recent years, are now back on the market. An exclusive, limited supply of these teardrops, the famous Appleton brand, which have remained No. 1 favorite with customizers, has just been made available.

These teardrops carry the endorsement of George Barris, custom car designer and builder, who is installing them on his dream-cars. Complete mounting brackets are included. Price is $22.50 each. Make and year of car should be specified.

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6

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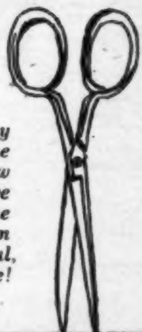

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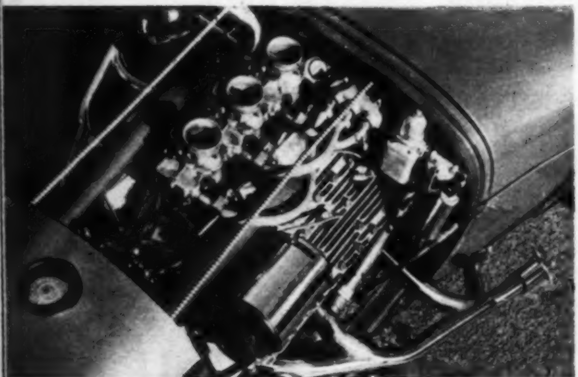
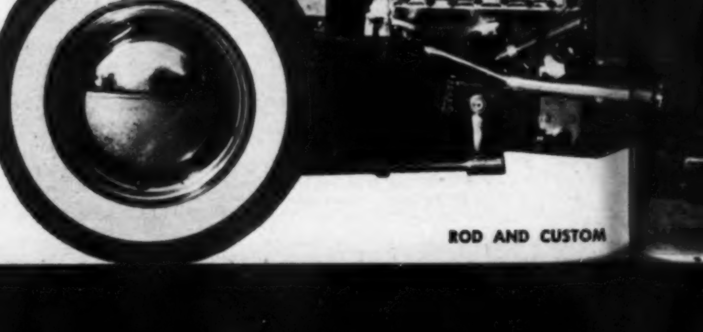
rod and custom
COVERage

From Provo, Utah,
comes Woodward's . . .



Thunder Rod's '40 block has 3-3/16" bore, 4" stroke. Sitting atop Evans manifold are three 97 carbs. Both ¾ cam and ignition are Harman and Collins units. Power passes through box with 26-tooth Lincoln cogs, then along a 32" driveshaft and into a 3.78 rear end. Reports have it that performance, especially handling, is extremely good.



Photos by Nohr

THUNDER ROD

ENTHUSIASM IS really a marvelous thing. Without it, the world would have to go on spinning without its hot rods and, nearly as bad, without Jerry Woodward's Thunder Rod. But luckily, Jerry wasn't deterred by such a minor thing as a crushed model A deck lid. And, following the enthusiast's adage that it's easier to subtract than to add, he went ahead and constructed his abbreviated roadster without even bothering to search for an undamaged turtle back.

Like many a predecessor, Jerry stuck primarily to Ford parts, with probably 90% of these being either Model A or '40.

From the A came the basis for the chassis. The side rails were kicked up fore and aft then fishplated for additional strength. Into the roughly rectangular frame went the X-member from the '40, with its pedal layout, then the original A crossmember was backed up against the later one, the whole forming a rough K shape, and the assembly welded together.

The car began to take shape as such things as the dagoed front axle and '40 rear end were added. The '40 V8 was given the works and placed forthwith ahead of its transmission. The remaining space behind the engine

(continued)

THUNDER ROD

continued

Cockpit boasts bucket seats upholstered in black. Panels and trimming are white and red. Roll bar is not only functional safety item, but doubles as mount for antenna and light. Driver faces a slightly narrowed '40 dash molded to Model A cowl. Total cost of the Thunder Rod was $900, took nearly 8 months to build.

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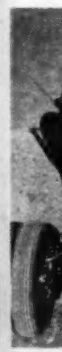

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dictated the size and shape of the body so, with torch in hand, Jerry commenced altering this and modifying that until the Model A bucket was securely affixed atop the 96-inch wheelbase chassis.

Because there just wasn't space anywhere else, Jerry sidestepped the gas-tank-relocating route taken by most A builders, and left the fuel container where Ford had originally placed it. But to conceal the A dash, the '40 panel was narrowed, then welded to the A cowl. Facing the dash are a pair of bucket seats, tastefully upholstered in black leatherette with white stripping. Red dominates the color of the carpeting and the lower portions of the door panels. The upper sections of the doors are done in white. To top it off, the cockpit is rimmed with red Naugahyde, heavily padded.

A roll bar was called for, but rather than having it jut lonely skyward as in other cars, Jerry worked it in as more a part of the car. It provides a mounting place for the dome light and radio antenna. Added after these photos were snapped, the bar also supports a padded headrest for driver and passenger.

Not satisfied with merely a unique, bright red (see cover) street roadster, Jerry is presently contemplating construction of a rear engined, three-wheeled vehicle for town use. And if it turns out as singular, yet practical, as does Utah's Thunder Rod, you can lay odds it will show up on the pages of Rod & Custom.

Model A's identity doesn't cease up front as on many street roadsters. Here an A radiator shell has been retained, though the grille is a refrigerator tray. Massive license bracket is Hudson, is flanked by twin upright guards. Note exhaust symmetry. Right photo reveals chromed air outlet which, when removed, allows access to the rear brakes and shocks.

A how-to-do-it feature

CHOPPING A

SOME FOLLOWERS of customizing trends have dismally predicted that top chopping is on its way out. While this may come as somewhat of a saddening revelation to many eager roof-lowerers, it is definitely not news that Detroit is presently turning out production cars whose vertical top measurements are far below those of older, customized cars which have undergone the height-reducing treatment. By way of example, try hacking a few inches from the top posts of a '57 Dodge. Sure, it can be done and there might even be a little excess headroom when you're done, but remember that you may want to carry someone in the back seat without them having to assume a pretzel-like position. Even more important is the styling concept of a late model car once you've leaded up the weld marks in the top posts. Dollars will get you lead paddles that what once was a good enough automobile is now something closely akin to a shoebox topped off by an undersized pie tin. In short, modern styling practically prohibits top chopping.

But, what of the millions of older cars on the road today whose vaulted tops clear driver's heads by feet instead of inches? Let's bring them all down to present day height standards.

So much has been written lately about whacking away at steel-topped models, that it looks like the convertible has been forgotten. And, to prove a point, we wish you could witness the letters requesting information on same. The same letters go on to query such unpublished details as window molding chopping, chrome frame chopping, etc. The importance of properly bringing either the folding or non-folding top down to coincide with the new windshield height, must not be underestimated, either. But more of that next month. Let's go on with the glass frames and posts. Ready?

Chopping a Convertible Top

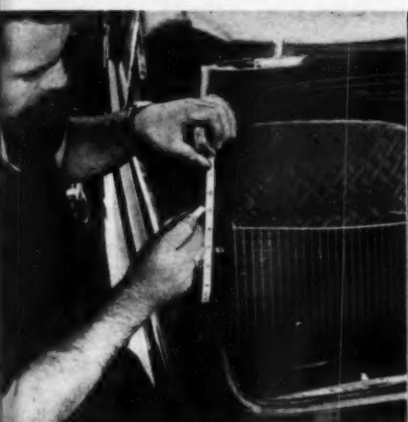
The Windshield Frame

Upper segment was narrower than base due to inboard slope of posts, so hydraulic jack (note bar behind hands) was used to spread narrower portion. Then it is clamped and . . .

. . . welded together. Weld is ground as smooth as possible then, since innards of post aren't accessible, area is tinned for leading. Steel wool used to spread heated compound around.

CONVERTIBLE TOP

Photos by Geo. Barris



The most important step of all is the first: deciding how much to chop the top. Lower it too much and vision is impaired, too little and your efforts are lost. Decision here . . .

. . . was to chop this '49 Ford three inches. Marks three inches apart are made near center of posts, hacksaw used to remove the section. All trim and glass was carefully removed first.

Lead is applied by heating sticks to fluidity then paddling it with special wooden paddle. When all low spots are filled, lead is filed to perfection after it has been allowed to cool.

Final step is cleaning lead of wax and grease, then sanding it to featheredge old paint edge and to rough lead so new primer will adhere. Several coats of primer will suffice for now.

Chopping a Convertible Top
The Windwings

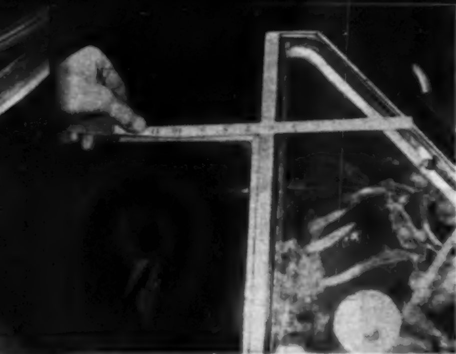
Windwing now juts above new height of the windshield posts, so it must come down a similar amount. A mark is made three inches down from top of frame on its forward edge.

...placed in vise after disassembly. Hacksaw severs frame at top. This portion of the frame is to be discarded so exact location of cut is not important. A V-cut is . . .

...then made at mark on leading frame edge, and frame is bent down as shown in the photo. It is brought down to point parallel to base. The cut is then carefully welded back together.

The rear post has been relieved of three inches of its height, rejoined to the main frame and welded into position. Excess channeling has been eliminated by cutting.

...rubber weatherstripping is replaced, cut where necessary with razor blade. Note that hinge bracket was not altered or location changed in any way. Next, inner frame...



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Ruler is used to mark rear edge of wind-wing frame. Door glass has been rolled three inches down from original height — it need not be altered in any way. Windwing is . . .

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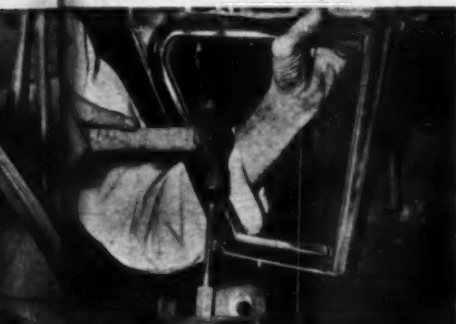
The movable frame within the main frame assembly is marked, cut and bent downward in same way. Note that frame is held up slightly here to provide room for the insulating rubber.

The glass frame is carefully rewelded as was done to main assembly. These steps are perhaps most tedious of whole operation but make the difference between poor and perfect jobs.



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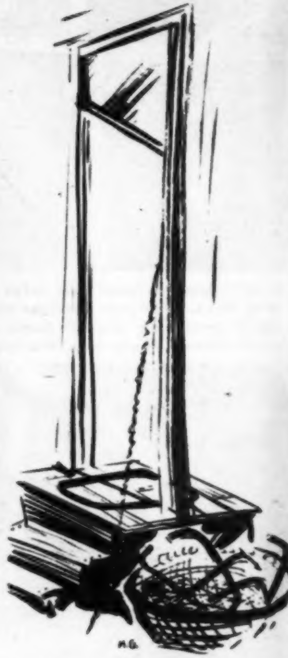
. . . is re-riveted to bracket. The small rivet is placed through the holes, held over a cup-shaped tool in vise. Hammer is tapped against end which swells the rivet to shape.

The completed assembly is replaced into the door. The only lacking detail is the glass itself which is best left to an authorized shop which has materials and tools needed.

Chopping a Convertible Top
The Window Moldings

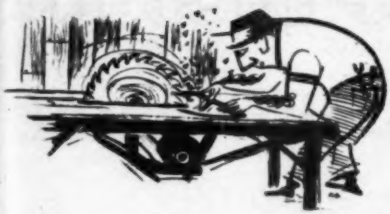


Luckily, we have only the windshield moldings to contend with on a convertible. Here the side piece is marked for cutting at the same location cut was made on upright post.

Three-inch piece which was cut off is reshaped slightly and slid in behind the molding. This will add strength to flimsy metal. It is then welded, and lower half positioned...

...and welded. All welds are then ground smooth and pieces sent to be plated or are painted. Last step is cutting, then replacing the metal channeling for the weatherstrip.

Chopping a Convertible Top
The Quarter Windows



NEXT MONTH:

Chopping a Convertible Top

Part II

Reworking the bows and top re-covering

Chopping the quarter window frame assemblies is a chore similar to that of windwings. A mark is made three inches down from the top in the shape of a V since forward . . .

. . . edge will be bent down to form part of the top. Frame is then disassembled. Care should be taken to save glass. New window is smaller, so glass can be cut from this one.

The V cut is made, and top portion folded down and welded to lowered frame top. As in other units, welds are smoothed, unit sent to be plated then assembled and installed.

Engineers are planning on springing (pun intended) air suspension on the motoring public within the next year or two. It is no secret that GM is interested, some of its buses featuring this ride medium since 1953. And Chrysler; Air-Lift engineers have been called into consultation. Which car will be first, though, is a matter of conjecture. Perhaps this type of suspension can assist we rodders and customizers. But, air ride is coming. Let's hear what Rog Huntington has to say.

ARE THE slide rule boys who are sweating over steel as an automotive suspension medium wasting their time? You wouldn't think so by looking over the new 1957 model crop. There's Chrysler's clever front torsion bar setup, Studebaker's variable rate coil spring, the new short forward sections on rear leaf springs to resist "wind-up", the large rubber snubbers on Ford-Merc rear springs to give a broad variable-rate feature, etc. Millions of dollars have gone into these developments on steel springs.

But there are a lot of smart boys who say *air* is the spring medium of the future. They want to replace the spring effect given by bending or twisting a piece of steel with a soft cushion of compressed air, acting either in some sort of rubber bellows or a cylinder-piston assembly. They say there are two big, important advantages: (1) The compressed air cushion is much more responsive to small, high-frequency road vibrations than steel, so gives a better overall ride; and (2) it's a simple matter to vary the *rate* of an air spring – so we can not only maintain a constant ride rate with widely-varying loads, but we can fairly easily provide for an increase in *roll stiffness* when the body leans in a turn. This last is important; it could someday mean M.G. handling with a Cadillac ride!

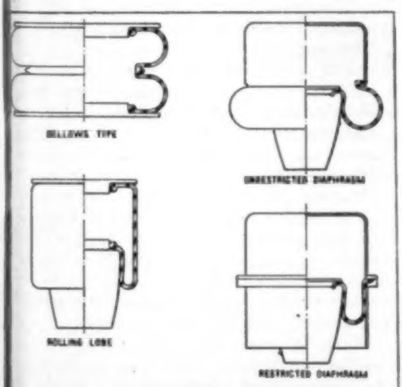
Yes, a lot of engineers are saying these days that steel has no future as an automotive suspension spring medium. Let's take a closer look at the arguments . . .

FINDING A SPRING MEDIUM

A car chassis isn't at all fussy about what you use for its suspension spring "medium". The only basic requirement is that we have some sort of arrangement that will let the wheels and axles move up and down relative to the chassis, to absorb road shocks, while providing just about equal force to return the "sprung mass" to its neutral point after it has been moved up or down by a road shock force.

There are many forms of natural springs. There is the spring effect achieved by *bending* a strip of steel; this principle is utilized in the leaf spring. Or we can arrange to *twist* a long bar of steel – and get a torsion bar spring. This torsion principle is also the basis of the coil spring. Experimental chassis have been designed that used the cushioning effect of big blocks of solid rubber. Others have put rubber in torsion – bonded an inner sleeve in a cylinder of rubber, and linked the suspension so that wheel movement would turn the sleeve and twist the cylinder of rubber. The latest idea in the secret design rooms of Detroit is *power* suspension; here we use some form of mechanical, hydraulic, or magnetic *force* to resist road shocks and return the sprung mass to its neutral position.

And then, of course, probably the most natural spring medium of all is a cushion of air. Since air is a "compressible fluid", we need merely confine a slug of the stuff in some kind of container that can be varied in volume – like a rubber bellows or cylinder-piston unit – and we have a very efficient spring. In many ways compressed air is an ideal spring medium. It's light, cheap, sensitive to the smallest vibrations, and – (very important) – we can change the effective *stiffness* of our spring by merely varying the *pressure* of the air in the container. How can you beat these specs with steel and rubber?



Various types of Goodyear experimental air springs – some featuring controlled expansion.

Air suspension, at least as we know it in its relatively crude forms today, will follow one of two general layouts. In one we have the suspension loads carried entirely by a flexible rubber bellows-type container; compressed air does the whole job, and we can change the spring rate by changing the pressure in the bellows. In the second basic layout we have our air (or gas) chamber *sealed* and balanced against an *oil chamber* through a flexible rubber or synthetic diaphragm; road forces are imparted to the air chamber through a piston acting on the oil chamber (since oil is not compressible). Effective spring stiffness in this case can be changed by merely pumping oil in or out of the cylinder-piston chamber.

Let's look at each layout.

COMPRESSED AIR SUSPENSION

This is the principle of the well-known suspension system used on some General Motors inter-city buses for the last three years (and which is now being offered in package form to outside truck and trailer manufacturers). The not yet disclosed Air-Lift setup on the R & C Chev pickup would also fall in this category.

Here we have our sprung mass carried directly by the flexible containers – that is, the chassis is supported on the axles or suspension arms by the bellows. Now the first thing that will probably come to your mind is the problem of *lateral* stiffness with this layout. The bellows have no inherent sidewise stiffness in themselves; how do we locate the wheels and prevent the bellows from buckling? Here we come to the first big bug with air suspension: Up-and-down wheel motion must be completely controlled by auxiliary torque links, radius rods, and sway bars. A leaf spring has a lot of lateral stiffness, and we can employ it to control wheel movement, resist axle "wind-up" under braking and accelerating torque, as well as providing the spring action. Not so with air springs.

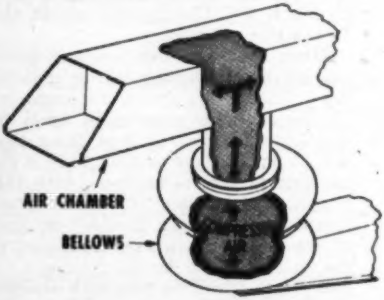
(continued)

AIR SUSPENSION
continued

We have to provide links to do the job here, just like with coil springs.

Sidewise *buckling* of the bellows is another matter. The bellows used with the commercial truck suspensions (Firestone, Goodyear, etc.) are short and wide, and have ribs molded into the carcass, so there's no problem here. Some models have various steel guide sleeves and cones to control bag deflection (see drawings). In the case of the Air-Lift cylindrical bag, they use a light coil spring surrounding the bag to restrain it and prevent buckling. This spring has a certain "rate" of its own, but this is small compared with that of the bag.

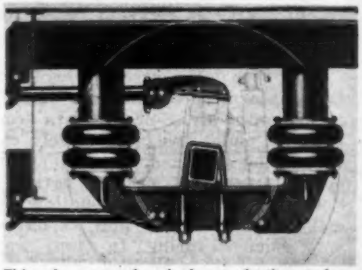
Then there's the matter of roll stiffness of an air suspension system. Actually, a spring that gets stiffer as it deflects—or one whose rate increases with deflection—is a desirable feature for a fast road car. This means that the resistance to body roll will increase the steeper the body leans, which is a stable situation. This is the effect given by the torsion anti-roll bar used on many coil spring front suspensions. On the other hand, too much roll stiffness gives a harsh ride and touchy cornering on rough surfaces.



Air Chamber and Bellows

Though various axle and wheel positioning setups define exact layout of individual cars, this is a typical installation as it will appear on cars in the not-too-distant future. The arrangement is used on the R & C pickup truck, but differs slightly due to beam axle on the hauler. Installation procedures will be illustrated in next issue, with ideas for other models.

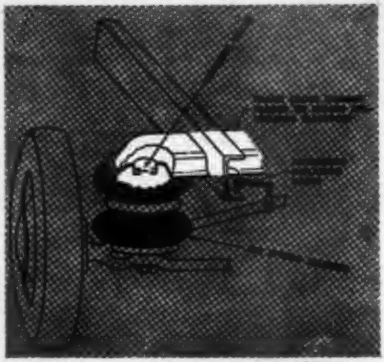
The amount of stiffening of an air suspension as the body rolls depends on the relationship between the total *volume* of the air chambers and the suspension travel up or down. This determines the amount of additional air compression as the body rolls. Obviously the Air-Lift deal would give a quite steep increase in roll stiffness with the deflection. The G.M. bus system, though, uses *two* bellows per wheel, connected by a large hollow beam member—so the effective volume of the air chamber is that of the two bellows *plus* that of the beam. This layout gives relatively little progressive roll stiffness. This is a factor to be kept in mind when thinking of the air suspension problem in general.



This air suspension is in production today—but is limited to use on trucks and busses. System of sturdy links controls wheel location since air bellows have no lateral stability.

The most important feature of air suspension lies in the ride department. The ability of an air cushion to respond to very small vibrations is only half the story. As you may know, how well any car rides depends a lot on the "natural frequency" of the sprung mass as it oscillates up and down on the springs (when acted upon by road shocks). Now this natural frequency is largely a function of the *deflection* of the spring medium. The more the deflection under static load, the lower the frequency. Best ride is obtained when the frequency lies somewhere between 60 and 80 cycles per minute—which is equivalent to a suspension deflection between 5½ and 10 inches.

Now a steel spring is essentially a *constant-rate* device. This can be modified somewhat by suspension geometry



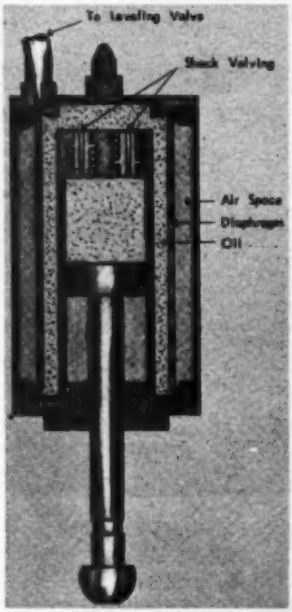
A variation on air suspension is this type where the air chamber is enclosed within the frame rails or a X-member. Engine-driven pump will assure constant pressure in chamber.

(shackle angles, etc.), but not to any great extent. In other words, our spring deflection — and, in turn, the ride frequency — is going to depend on the load in the car. The more load the lower the frequency, and probably the better the ride. With air springs, however, we can readily adjust the deflection by varying the pressure in the air chamber. On the G.M. buses they have special valves mounted on the frame, operated by linkage from the axle, that lets air in or out of the bellows to maintain a pre-determined height between axle and frame, regardless of the load in the bus. (This requires a compressor and reservoir tank, of course.) On a typical bus installation the ride frequency is held around 80 c.p.m.— which requires a bellows pressure of about 45 lbs./sq. in. when the bus is empty, and 80 lbs. with full load.

The Air-Lift deal isn't quite so elaborate as this, of course. Here we have to adjust pressures "by hand", so to speak; so it won't be convenient to allow for every small change in load. However, it's awfully nice to be able to vary the effective spring stiffness for different types of driving (fast highway travel, street, competition). With Air-Lifts we can use extension tubes to bring the inflation valves out to convenient points on the outside of the car, so chamber pressure can be adjusted easily. Actual pressures needed for various stiffness figures depend on a number of factors — including bag size, static height, size of retaining coil, etc.— and would have to be determined pretty much by experiment. (We will have more information on this next month.)

AIR-OIL SUSPENSION

It is significant that the first automotive production application of air (or gas) as a suspension medium — on the new French Citroen DS .19 — utilizes the air-oil layout. This is also the principle used with the Delco "struts" on the G.M. Firebird II show car . . . and you can look for the 1958 Chevy to use something in this line!



Internal schematic of the GM — Delco air-oil strut on the Firebird II "show" car. Notice the very compact layout of the unit.

As mentioned earlier, in this layout our air chamber is sealed, with a flexible diaphragm at one end balanced against a cylinder of oil. The road wheels are linked to a piston acting

(continued on p. 62)

A stretch in the service can't deter automotive enthusiasm.

Inside
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TIM'S TENNESSEE FLAME

A LOT OF cars have been dreamed up while the would-be owners were in the service, and Tim Rochlitzer's is one of them. Tim was stationed at Tennessee's Fort Campbell and that's where the whole thing started.

The biggest headache was finding a shop in the area where the work Tim had in mind could be carried out. As soon as he had peeled off the door and trunk handles, most local bodymen thought he was crazy and wouldn't touch his car for anything. But perseverance paid off and at Denny's Garage in Clarksville hole-filling and seam-frenching was commenced.

Once again, the same trouble arose when painting time rolled around. Few painters would think of going along with Tim's wishes, so it took more arguing before a local color-dauber could be convinced that flaming was really *the* thing to do.

Upholstering ditto. But Tim finally

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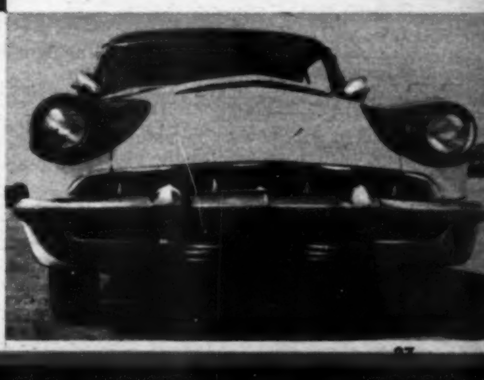
Inside of Cadillac engine remains essentially stock — produces enough horses to haul the flamed Merc around with little strain. Fit was tight, but performance is gratifying.

BY MARGE LAWRENCE

Backside upset Tennesseeans since lack of original taillights made identification hard. "California tilt" of dagoed Merc shows off chassis, does nothing for car's performance.

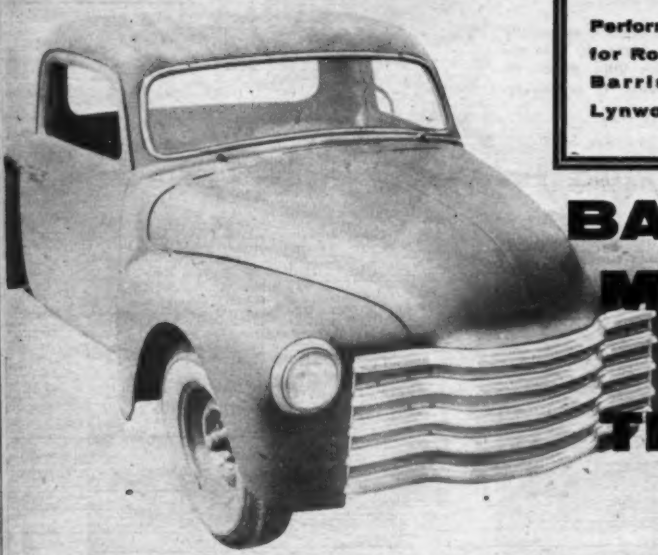
Outside of filled hood and frenched lights, most striking note of Merc is wild painting. Tennessee enthusiasts have taken up "flaming" after Tim got them started on the odd fad.



had rolled and pleated Naugahyde with layer upon layer of foam rubber beneath the seat coverings.

Power is a '56 Cadillac; stock right now but the future should see many changes in this department.

Three years may seem like a long time in which to build a conservative custom, but Tim is real proud of his Flamer. It takes time for ideas to jell and be put into action – and here's the final result. ●



Performed exclusively for Rod & Custom by Barris Kustoms of Lynwood, California

BARRIS MEETS THE TRUCK

Part IV

IT HAS BEEN a long time since the original design for the Rod & Custom pickup truck was set down, and ideas, fads and styling concepts have changed not a little since then. In order to keep pace with the times, we have had to change and re-change our ½-ton many times making our project doubly difficult. But there are a few things originally incorporated into stylist Lynn Wineland's sketches which have stood the test of time. One of these is the sculptured-style hood scoop.

Those who have seen the rolling laboratory have wondered why the odd-shaped gizmo in the center of the dash. This innovation is actually the tailend of our now-to-be-installed air scoop, though it admittedly preceded the intake by two years. And it will be the dash "gizmo" which will be our guide in the following scoop-building how-to-do-it.

Stylist Wineland had dictated a scoop with a specific amount of frontal area; a scoop which would duct air to the engine compartment as well as to the interior of the cab where ventilation was a prerequisite. We didn't want an extremely high or overly wide scoop which would be out of keeping with the truck's overall styling, thus, our approach was to trough the hood which would position the scoop's opening *below* the top of the hood as well as above. To top off the deal, the scoop would have to apparently run *through* the windshield, terminating with the aforementioned dash gizmo. (As luck would have it, this is somewhat the concept Mercury has achieved in their '57's with the trough passing through the rear glass.)

Thus; our problem: Cut a twelve-inch wide, three-feet long hole in the hood. Fill the void with a section of dished metal. Then, produce the scoop itself over the rear of the hood, across the cowl and make it functional! Sound simple? Just try it some time. The hood all but collapsed when its center was severed, but Barris' best metalmen saved the day as we'll disclose in following photos:

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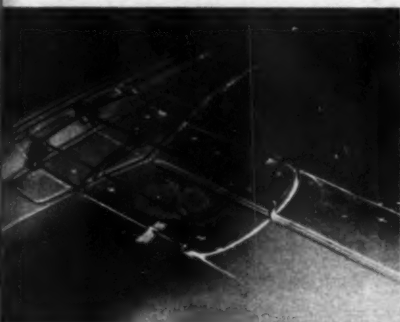
A center line is drawn across the cowl using the dash as a reference. The "thing" in the dash houses an instrument cluster, will appear to be the end of the scoop when finished.

Section to be "dished" is within the chalked lines running across the hood, from second line aft the scoop will stand above existing height of cowl. Cowl vent door will be filled.



A "basket weave" maze of welding rod is hand shaped, tacked in place to signify shape of scoop. Metal will be shaped to duplicate the surface configuration dictated by the rod.

An air chisel relieved hood of its center, exposing engine room. Radiator filler cap will have to be moved to front side of tank. "Basket weave" has been worked in here, too.

Jack Sutton, race car builder, runs metal through an English shaper until it matches mock-up made from welding rod. Extra inches are allowed all around, will be trimmed off.

Dished center section is tried for fit. This panel is not a straight trough, but is compound-curved to follow slightly forward-curving hood line. After trimming, the piece . . .

...Is brazed, rather than welded, in place to prevent severe heat from warping hood. Edges are first tacked every few inches, then brazed solidly with a continuous bead.

With center trough worked in, trimming-template is made for scoop. Ends of cowl door are welded down, center will be eliminated so air may pass directly into the cab.

Trough terminates near hood nose, two halves of hood are brazed before lead-filling. Here grinder cuts rough edges of brazing, brings high spots down and shows up the low ones.

Sections requiring leading are tinned prior to lead application. Tinning compound adheres to steel, lead sticks to compound. without it, there would be no bond between the metals.

Which brings us up to this point. Chromed screen within scoop opening gives finished look, prevents any objects from being drawn into either engine compartment or the cab.

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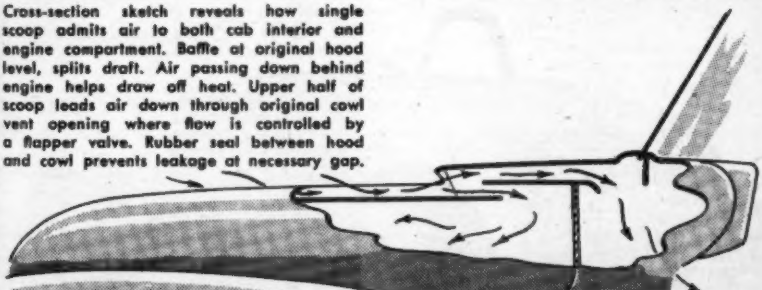
Forward edge of scoop is chalked for trimming to conform with sketches. Heavy rod will be welded around edge to give it a rolled appearance. Hood opening will be cut later on.

Scoop is tack-brazed, then cut made between cowl and hood. Wet sponge is placed atop scoop to minimize warpage. Small filet of lead will blend scoop to surrounding metal.

Minor defects are "slapped" down, similar tool is held underneath to back up blows. This step requires a great deal of practice or else the novice may ruin job at this point.

Marks of slapper are filed away, minutest of flaws eliminated. Entire hood is cleaned of wax and solvent, paint feather-edged and heavy primer coats applied and allowed to dry.

Cross-section sketch reveals how single scoop admits air to both cab interior and engine compartment. Baffle at original hood level, splits draft. Air passing down behind engine helps draw off heat. Upper half of scoop leads air down through original cowl vent opening where flow is controlled by a flapper valve. Rubber seal between hood and cowl prevents leakage at necessary gap.



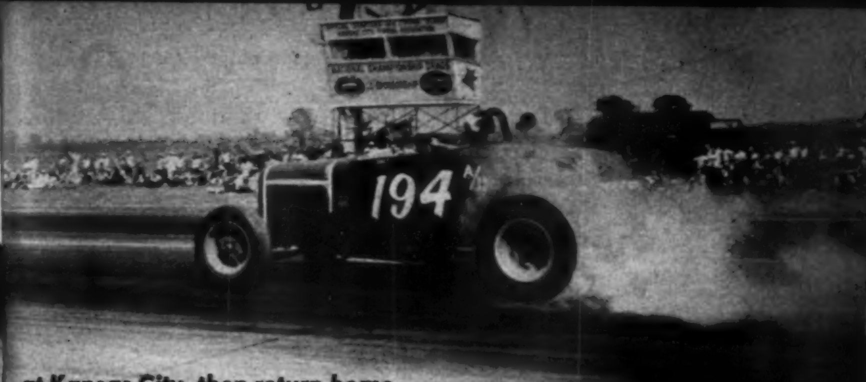
Two Akron, Ohio Roadsters go the National Drags

...JUST A COUPLE

AS NEW drag strips open across the country, areas which were but a short time ago devoid of any outward sign of hot rodding activity suddenly begin to produce some real short strip stormers. Akron, Ohio, has received some publicity the last several years as the home of *scuderia arfons*, the stable of famed aircraft engine-powered *green monsters*. Perhaps the sheer novelty of these vehicles overshadowed the fact that the same city was spouting forth some *very* potent, more traditional machinery.

The National Championship Drag Races, conducted by the NHRA at Kansas City last fall, drew out some of the hottest performing iron ever built. Unobtrusively, two red roadsters arrived from Akron. Conforming to specifications for *A/Roadster* under NHRA's rules was Dale Hartong's Chrysler-powered '29 A on Deuce rails. This was to be the first competition event for this car. Dale, president of

A/Roadster championship car uses Halibrand q.c. and mag wheels. Engine is 335hp Chrysler bored and stroked to 4" square, for a displacement of 402 cu. in. Camshaft used is a Howard SU steel billet assembly. A Scintilla magneto sparks the fuel mixture delivered by the Hilborn Injectors. Heads are by Ray Brown.



rags at Kansas City, then return home . . .

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the Cam Jammers, one of Ohio's first clubs, chose to let Jiggs Shamblin do the honors of laying the 335 horses onto the asphalt in the proper manner.

The other car, falling into the *B/Roadster* class, was Otis Smith's Chevy-eight fired '27 T, resting on an abbreviated Model A frame. Otie, a well-known sparkplug in the Midwest, is NHRA Regional Advisor and operates his own speed shop at 2050 Manchester Road in Akron.

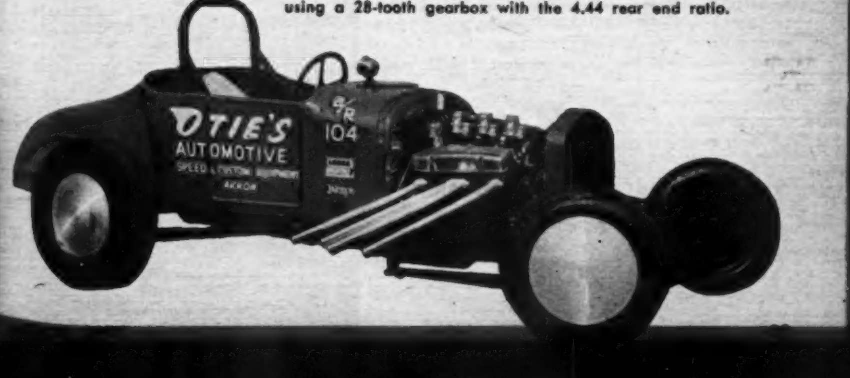
It's not necessary to go into a long song and dance about the tuning in the pits, the trial runs and gear changes to better elapsed times that were made during the big four day event, to get across that these two cars were pampered and groomed to top shape.

The final night was awards presentation and in the ensuing program, trophies were given to the winners.

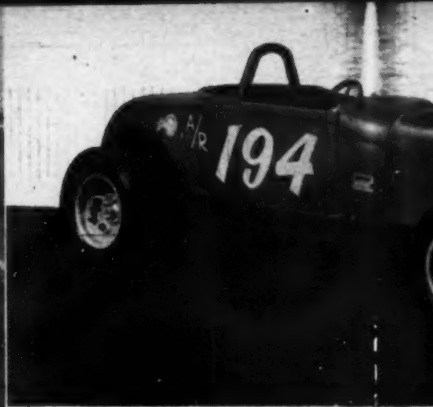
National Champions: *A/Roadster* Class, Dale Hartong, Akron, Ohio. *B/Roadster*, Otis Smith, Akron, Ohio.

. . . Just a couple of Champs. ●

Three 97's top off the Edelbrock manifold on 283 in. Chevy mill which propelled B/Roadster class winner. Displacement was obtained by boring to 3⅞". A Howard M-2 steel cam assembly activates the valves in the reworked heads. Ford exhaust valves were used because of their light weight and lasting qualities. A Scintilla mag sparks the Lodge plugs. Jahns 10:1 pistons were selected when building the stormer as were a Wil-Cap flywheel and Weber Safti-Torq clutch. Second gears starts are made using a 28-tooth gearbox with the 4.44 rear end ratio.

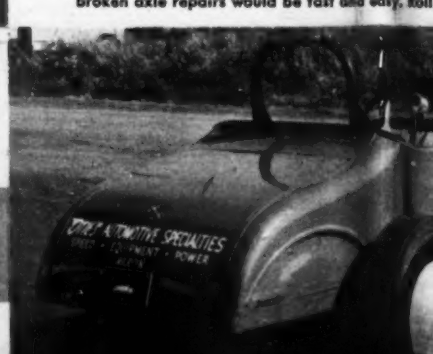


Smouldering off the well-worn starting line, Smith's Turbofire-T begins plunge toward quarter's end. 12.46 seconds later, speed was 115.88 mph. A consistent performer, record fell at a veryfast 115.23 mph.



Hartong's "Transfusion" flees [illegible]
[illegible] record was 119.23 mph, car turned

Engine location in frame was cause for shift of
shortened "A" rails, car weighs less than 1900
uses Halibrand magnesium hubs on full-floating
broken axle repairs would be fast and easy. Roll



. . . JUST A COUPLE OF CHAMPS

continued

...ioes into traps edging out similarly Chrysler-propelled Outcasts' Roadster from Arizona. Althou[illegible] speed which estab-
... mph, car turned 123 during trials. Car's performance to gain championship was gratifying. [illegible]

...s cause for shift of '27 T body to extreme aft end. With ...hs less than 1900 pounds, has 100" wheelbase. Rear end ...ubs on full-floating modified truck spindle assembly. Any ... fast and easy. Roll bar, above head height is very sturdy.

Minimum of gages prevents confusion in scantily furnished T office. Center steering is modified '32 Ford topped with midget racing car wheel. Sun tach is in line with driver's view of course for easy reading.

SEATTLE SIZZLER

An old theme makes a new comeback.

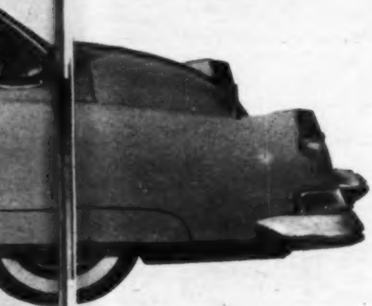
IT SEEMS INEVITABLE that young America, faced with the awesome production of over 5 million pieces of Detroit iron per annum, would tire of the link sausage likenesses and head off on its own trends.

Seattle's Jim Berg is an outstanding example of this quest for "something different". Like most high school lads he took street irons for granted until he saw his first custom. And that started it. From that time on, the kid would not, could not, hear of stockers. Deciding to "go the route" on the ever-popular '49-'51 Chevrolet models, Jim scrounged up a clean '49 convertible and proceeded along these lines.

Not satisfied with merely good looks, the hood now closes over a 303 cu. in. Olds V8 which delivers its power to a narrowed Olds rear end through a hard-to-get Cad stickshift box.

Finally completing the year's-long project Jim was asked if he'd ever again consider driving a stocker. His answer? You guessed it—*Never!* ●

Kaiser and Ford grille parts were used in front end make-up, along with minor pieces from a Pontiac. Lights were frenched using '52 Ford rims. Resulting conglomeration may sound gruesome but photo reveals how grille fits in well with car's over-all styling. The front bumper is a narrowed '49 Cad unit.



BY PETER SUKALAC

Oldsmobile and Cadillac were called upon to donate the top (Olds) and rear fenders (Cad). Top photograph discloses use of Cad dash panel (narrowed to fit) and motif of upholstery carried out in orange and white plastic. At center is revealed front seat arm rest with record player which emits sound through twin speakers, one visible below turntable.

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Three years ago this month R & C unfolded the strangest story in hot rodding history. Now, 36 issues later, let's reflect back to 1954 and see if the World's Smallest V8 engine still rates top billing, and what changes three years have made to Norm Seymour's 7-inch long ohv bent-eight: the smallest operating, multi-cylinder, 4-cycle engine in existence.

Norman Seymour and . . .

Photos by Beindorff

. . . THE WORLD'S SMALLEST V8

The World's Smallest V8 has been reworked considerably since R & C displayed it last. Bore of 15/16" is the same, but stroke has been increased to 15/16" making the engine square. Displacement went from 4.8 cu. ins. to 5.46 cu. ins. Lightening of crank, flywheel and valve train helped in raising rpm's.

IF YOU missed the March '54 issue then you haven't heard about Norman Seymour. If you caught the story, then you've probably wondered what has become of the world's smallest ohv V8 engine and the man who built it. Either way, its time everyone was brought up to date on the most fantastic story we've ever presented.

In 1951, Whittier, California's Norman Seymour decided to build an engine; not build up an engine, as one would a standard automobile mill — but to put one together from scratch. Since Norm's knowledge of engines, at the time, left something to be desired — and as his drawer of finished but cast-off parts bears evidence — he was taking off on a kick entirely new and mysterious to him.

He began with a block of aluminum, and after many months of drilling, boring and machining, it had been reduced to seven inches in length with a weight of a little over four pounds. But, to the experienced eye, it vaguely resembled something quite familiar, a V8 block.

Into the block went the steel sleeves from model aircraft engines, and into them went a set of 2-ring pistons. More aluminum was carved into heads, oil pan, timing gear cover plate and flywheel.

From a chunk of 4130 chrome moly steel he laboriously crafted a crankshaft, complete with counterweights and all the other factors which make up the more familiar, full-size unit. And then came the headers, the rods, the camshaft, the lifters, the manifolds,

the valves, the distributor and other ignition parts. In fact, it would be easier to list the components which Norm *didn't* make; pistons, spark plugs, valve springs, ball bearings and timing gears. The rest of the over three hundred parts were figured out, sketched, designed then built using the machine tools at his disposal at the plant where he was employed.

The idea behind the whole thing was born when Norm switched from making costume jewelry for friends, to twiddling with model airplane engines. His experience at turning out bits of earrings, etc., revealed he had a flair for the unusual and the small. And engines had always fascinated him. He soon went further than most model builders do; he mounted four single-cylinder model engines on a common crankcase he machined out and turned up with an opposed 4-cylinder 2-cycle mill which later destroyed itself when a rod tore a hole in the block.

Weakness of available parts, Norm decided, was what had cost him his engine. So, then and there he made up his mind to go ahead on his own and literally make every part he possibly could in an engine of his own design.

By '51 the overhead valve V8 engine had reached new popularity which led Norm to believing this design had something to offer. So it was an ohv V8 that took shape on his drawing board – not one patterned after an existing engine, but one designed by a man who had never paid much attention to what made the wheels of his car turn. The problems became almost inexorably baffling, but Norm never asked a mechanic a question, never raised the hood of his Cadillac to see how GM had solved a particular dilemma. Nor was construction hit or miss. When he had finished the two years at his drawing board, Norm knew the designing project was completed and that the engine would probably run.

Or so he thought.

Late in 1953 the ten-pound miniature was ready to fire up – but it coughed on the first try and promptly died! Two weeks of disheartening firings, then dyings, led Norm to believe that the engine would never run as planned, it would never respond to throttle control nor would it just idle happily away. Then came a revelation.

Master machinist Norman Seymour looks fondly at six year's work – the equivalent of a pound per year! Actual horsepower has never been determined, but has been carefully estimated at between $3\frac{1}{2}$ and 4 – not far from the coveted one for one mark. Seymour would be interested in hearing from anyone with a dyno small enough to measure the V8's output.

Experimenting with a natural gas outlet in his workshop, Norm discovered that with this gaseous fuel the mill barked loudly to life and would run without a hitch until he tired of it and shut it down. But on gasoline – nothing! Liquid fuel atomization was the stumbling block. The original carburetor just wouldn't work. A new one was designed and built, then another and another. Each time the V8 would *almost* act as planned, but not quite.

It was about this time that R & C came upon the scene and brought news of the fabulous toy to the automotive world. Barney Navarro, of Navarro speed equipment fame, was brought in for consultation and he announced that the firing order and manifolding of the pint-sized bent-eight was wrong. The firing order was such that fuel was be-

(continued)

WORLD'S SMALLEST V8
continued

ing ducted through a siamese intake port to cylinders which fired consecutively. Thus, the first cylinder of the pair to fire would use up the available fuel in the port, and the next cylinder in line would starve for fuel. Navarro told the sad news — a new manifolding and carbureting layout was needed! This would mean not only redesign and construction of these parts, but new heads as well.

Norm Seymour then left our offices and, until just a short time ago, might as well have disappeared into thin air, as far as we were concerned, for letters, wires and phone calls in his direction brought us no word whatsoever during the intervening three years.

To the relief of all, however, Norm reappeared on the scene — with his fabulous V8 under his arm — and blandly announced that he had rebuilt the entire engine using only the original V8 block as a starter.

Into the lightened block went a lighter, stroked crank — stroked by 1/16 of an inch. New, longer rods aided in raising compression. The valve train — cam followers, pushrods, rocker arms and valves — was lightened by 30 percent, Norm was after even greater rpm's than the 7,000 the ohv had turned up earlier. The 6½" cam was reground by friend Kenny Harman (formerly of Harman & Collins) and the bearings originally suporting the ends of the crank and the cam were replaced with babitted bearings. New heads and manifold solved the fuel induction problems and, while he was at it, a wedge-shaped combustion chamber was designed which has proven far more effective than the flat domes used previously.

The flywheel was trimmed from 4 pounds to less than one — assisting materially in fast wind-up. Once again assembled, it was determined that compression had gone from 4 to 1 up to 7 to 1, and that engine weight had dropped from slightly over 10 pounds to 6.

A dual point ignition system was designed which outdated the previous arrangement and a dual throat, floatless carburetor built which overcame all the original problems in this department.

And to prove the thing would actually run, Norm spun the flywheel with one hand, while twisting the throttle with the other, and the tiny V8 barked to life and roared away, responding instantaneously to throttle control.

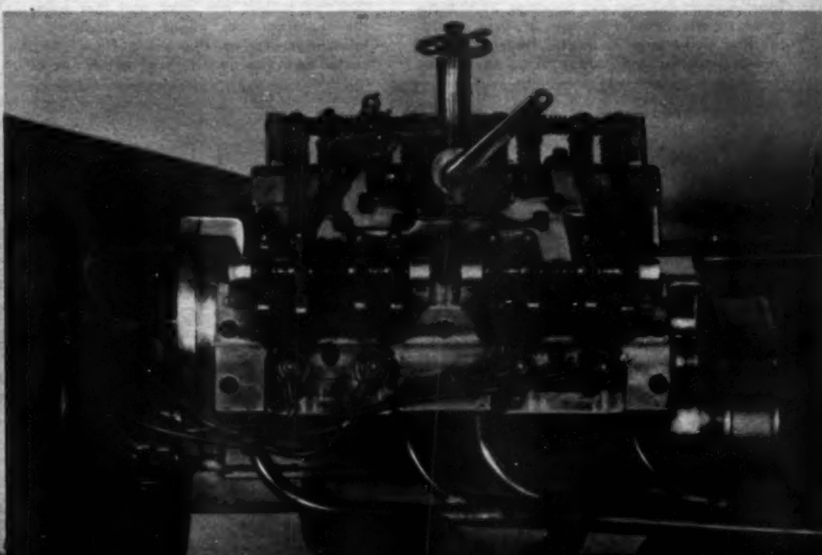
Ever hear a modern V8 engine scream up to 10,000 rpm? Chances are you've never been treated to the sound, but Norm wound his 7½-inch miniature up to this point and the sound, though less in volume, sounded no different than the roar one hears at Bonneville or the far end of a drag strip.

Norm nudges the throttle and the V8 revs up close to 10,000 rpm. Oiling is by splash system so the rocker arms must be lubricated every so often from a can. Since it was featured in our March '54 issue, Norm has reworked every part, replacing many of them with new components. The 6 lb. V8 will idle quietly down to 800 rpm, buzz quickly up displaying instant response to the throttle.

Three years ago Norm promised that he would build a dynometer, clutch and transmission, a radiator (the engine is jacketed for water cooling) and an oil pump, since the splash system used leaves much to be desired. But when Norm was asked what had become of these projects, he pointed to his completely rebuilt engine, with its new crank, cam, heads and so forth, and quietly admitted that he'd had plenty to keep him busy. That there was little sense in building accessories if the engine itself didn't live up to expectations. But as he talked we spotted working drawings for another miniature V8 — this one sporting overhead cams — and we suspect that he's going off on another kick before the promised additions are constructed. ●

One of the original heads is compared to the newly refinished V8. Original heads had no combustion chamber within them, but the new ones have a wedged-shaped chamber. Note on old head the valve held slightly off its seat. The valve train has been lightened 30 percent in new version of bent-eight, aiding quick response and assisting in raising the rpm's.

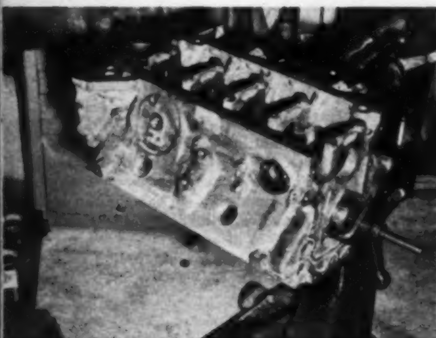
The only purchased parts in this photo are the valve springs and spark plugs. Norm made the rockers, pushrods, stands, valves; in fact he designed and built over 300 intricate parts for his tiny V8.



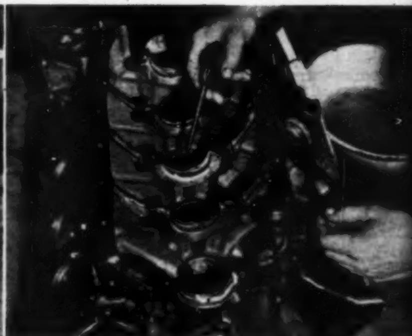
hopping up the

Ford OHV's

THERE'S AN old saying, "Anybody can put an engine together." Believe me, there are quite a few on the road that run and sound like "Anybody" *did* put them together. In the following text we will try to outline things which are extremely important in doing the right kind of engine assembly. If you're still with us from last issue, you remember we have a bored

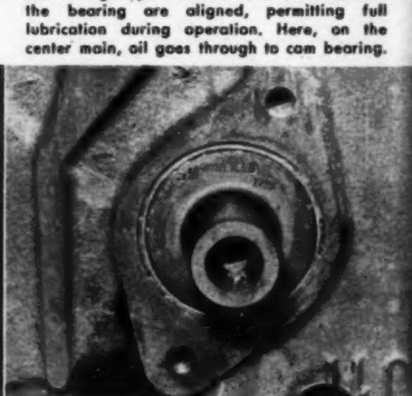


Don't neglect to put new cam bearings in your engine. Pull out old bearings as shown. Often overlooked, a sloppy fit here could cause a noisy engine, as the center bearing supplies oil for both sides of rocker arms.



Squirting oil down the oil passages assures that the galleys are clear and that holes in the bearing are aligned, permitting full lubrication during operation. Here, on the center main, oil goes through to cam bearing.

Wally Cartwright knows and shows proper way to install a precision cam. Support in two places at all times to avoid nicking new cam bearings or damaging lobe surfaces which could easily cause erratic action of valves.



The cam installed, just before bolting on thrust plate. One of Winfield's SU grinds, *engineered* for the Ford ohv engine, was selected. Despite deceivingly docile idle, action of cam at high rpm's will satisfy.

Part IV BY LES RITCHEY

block with all the components ready to be assembled. With the block upside down, the tappets are oiled and installed into the guide holes. Check each guide bore for fit to the tappet. This can be done by simply pushing the tappets to the bottom of the bore and then rock the remainder of the tappet stem in the block and observe the clearance.

(continued)

Using a fine powdered graphite as an extra lubricant, tappets are first moving parts to be installed. These lifters, like all other moving parts, were treated to Dri-lube process. A little oil is used in guide holes.

More graphite and oil are used on cam; both lobes and bearing surfaces. Dark color of cam is result of Dri-lube process, which has been found to keep cam wear and loss nil without necessity of other hardening jobs.

One hundred foot pounds is the reading when properly torqueing the main caps. *This procedure cannot be stressed too highly,* but is often overlooked by younger enthusiasts. Wrong or unmatched tension causes warpage.

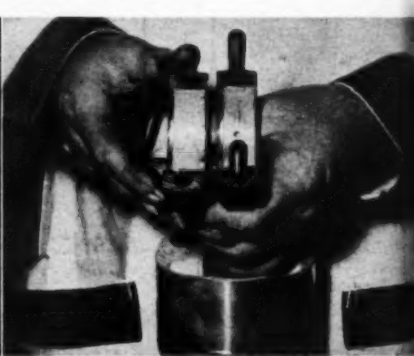
Tighten all main caps except center thrust cap screws. To establish proper crank-to-thrust-surface contact, force crank forward and thrust cap back. Torque up while forcing or half of surface will wear considerably.

HOPPING UP THE FORD OHV's

continued

This should be no more than .003". Also at this time it is a very worthwhile precaution to use some kind of a graphite lube process on these parts to insure no galling or hanging up. This is especially true if the engine is not going to be run for a period of time. I highly recommend the dry lubing process to be used on all moving parts. This can be done by the Dri Lube Corporation of Glendale, Calif. In my opinion this is a must and surprisingly enough is very inexpensive, running less than $25.00. The cam can now be installed to hold the lifters in place. The cam and lifters should both be installed before the crankshaft because without special tools the lifters are almost impossible to place when the crank is in. When the crank is installed all the mains should be plasti-gauged, checking for proper clearance. This will tell you if in the process you happened to get a minute particle of dirt under one of the inserts, and can be taken care of before it's too late. Also, the thrust main has to be

As described last month, the extreme over-stroke used in the 'Bird engine resulted in contact between the rod side and bolt, and the camshaft lobes. Rod on right side has been ground down for clearance (see arrow).



It may be seen here that side of bearing to the left does not extend to the full width of rod or cap. If care is not exercised during assembly so rod's open side is toward outside of throw, inserts may be wiped out.

Very important torqueing operation is employed again as rod caps catch a load of 40 lbs./ft. Many a builder has lost much of his potential power by failing to observe proper torque specs. *Don't you!*

Plastigauge checks for proper clearance. Placing it between throw and insert, torque properly, disassemble then compare compressed width to scale on outside of package. Corresponding width shows final clearance.

adjusted at this time (explained in photo caption).

Next, the set of rings for each piston should be checked in their ring grooves, then installed in the bore and the ring end gaps checked. As a rule of thumb —you can figure .003" for each inch of bore. The rings should be fitted for a particular bore and piston and installed on the piston in the bore just checked. The ring gaps when installed on the piston should be staggered 180 from one ring to the other, the top ring gap being the farthest away from the camshaft side of the piston. This is to get the ring gap, which is a source of pressure leak, away from the center of the combustion's maximum pressure at time of compression. When the pistons are installed in the bore, the rods should be positioned so the side of the rod which the con rod bearing surface does not fit flush with, rides the relief side of the crank throw. The throw is beveled and it is obvious what can occur if this is not observed in your assembling procedure. An accompany-

(continued)

Importance of correct ring gapping is often overlooked. If clearance is insufficient, rings will break, engine failure can easily occur. Too much gap will result in loss of all-important compression hence poor performance.

Grant rings were selected for this engine. With no mechanical spreader, only way to install rings without breakage is shown. Using first knuckles of thumbs butted together, ring is spread with forefingers as guides.

With rods in place, Wally spins cam while author Ritchey turns crank, checking clearance between rods and cam lobes. While very time consuming, it's obvious that contact between cam and crank parts could destroy . . .

. . . engine or at least harm valve timing by changing lobe shape. Feeler gauge, inserted through opposite bore, is required for final check which must show a minimum clearance of .030" in all places of contact.

HOPPING UP THE FORD OHV's
continued

ing photograph illustrates what to look for. The bearings on the con rods should also be plasti-gauged and torqued to 40 ft./lbs. Make sure the rod does not boss on the piston pin and is free to move up and down on the crank throw after it has been torqued. Any finding at this point will cost you much in working horses!

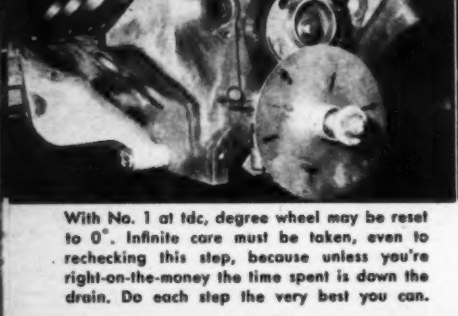
While mentioning torque, I feel it is very important that *every* nut and bolt in your engine should be torqued, and to proper specs. These can be found in any owners manual or equipment makers specs. The person who thinks he has the "feel" might be stronger than he thinks. Those cap screws can't yell when they are tight, they just quietly stretch out of shape. Don't guess, just "torque em up."

As we wrote in the last article, the cam and its selection is of the utmost importance. Degreeing falls right into this same category, for if you do not degree your cam, you still don't know

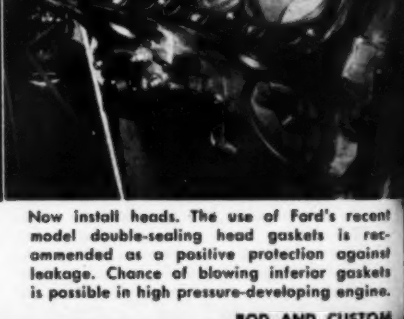
(continued on p. 64)

Howard aluminum flywheel was provided by manufacturer. Extra tough face combined with light weight without sacrifice of strength because of ribbed backside, makes this an ideal unit. Runout gauge watches for wobble.

Tenslite aluminum clutch assembly from Sports Car Engineering is torqued to flywheel. Because spring tensions of this unit are 240 lbs. each, bolts run *through* the flywheel and have aircraft-type locknuts on forward side.



With No. 1 at tdc, degree wheel may be reset to 0°. Infinite care must be taken, even to rechecking this step, because unless you're right-on-the-money the time spent is down the drain. Do each step the very best you can.

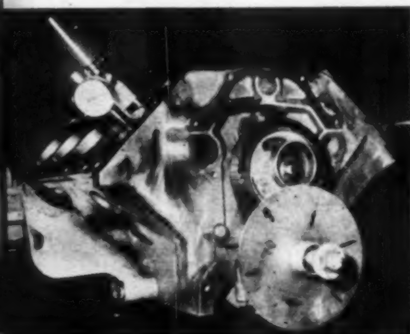


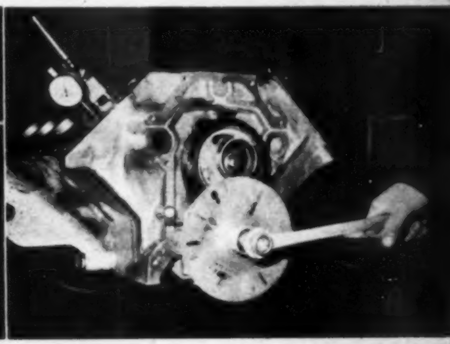
Now install heads. The use of Ford's recent model double-sealing head gaskets is recommended as a positive protection against leakage. Chance of blowing inferior gaskets is possible in high pressure-developing engine.

TORQUE CHART

SIZE (INCHES)	¼-20	¼-28	5/16-18	5/16-24	⅜-16	⅜-24
TORQUE (FT.-LBS.)	6-9	6-9	12-15	15-18	23-28	30-35
SIZE (INCHES)	7/16-14	7/16-20	½-13	½-20	9/16-18	⅝-18
TORQUE (FT.-LBS.)	45-50	50-60	60-70	70-80	85-95	130-145

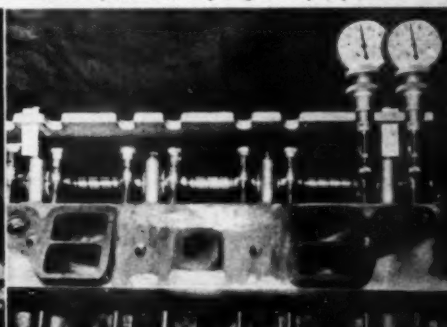
In the event any of the listed torque values for given sizes do not correspond with your manufacturer's specs, always adhere to the manufacturer's specs.





With degree wheel set at 0° on crank end, dial indicator shows .000" with piston at top dead center. Rotate crank until dial indicator shows .020", note number of degrees on wheel. Reverse crank rotation . . .

. . . until the indicator again reads .020" and check degrees. Add total degrees, divide by two and turn crank back *that* number. No. 1 piston is now at exact top dead center and further procedure may begin. *Very important!*

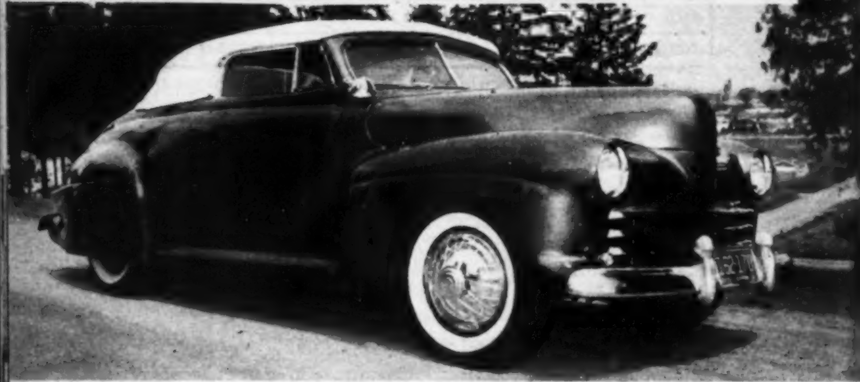


Further assurance against leakage is to start by torqueing (*that word again*) centermost bolt and working outward in ever-expanding circle. Wrong sequence causes head warpage which, in turn, prevents positive head/block seal.

Two P & G valve lift gauges check intake and exhaust timing in one trip. With piston at tdc of overlap stroke, both valves will show identical lift. Cam is then in correct time with piston. If not, keyway shift is needed.

They go in for customizing up North, too

CANADIAN CAPER



Canadian customizing closely follows the patterns set by U. S. enthusiasts. Stripped of chrome, devoid of external goodies, the trim-less Ford mirrors planning and forethought for ultimate one-piece look. Chopped top is 4-inches down.

THE BOYS NORTH of us have not been given the publicity they deserve of late, so hoping to spread glad tidings throughout Canada, here is what we hope to be the first of a long line of Canadian Customs.

Don Sherwin enviably eats and sleeps cars. Though he clerks at a market in South Burnaby, British Columbia, he spends his after-hours time, as well as days off and weekends either digging into the depths of his own custom or helping his friends with their automotive problems.

The bug didn't bite Don until a friend, Dick White, showed him his nearly-completed '41 Ford convertible. And that did it. To make a short story even shorter, Don acquired Dick's ragtop and kept on going in the direction the former owner had started.

The collapsible now sports a non-folding, padded top (of the type usually referred to as a Carson but built in Vancouver, B.C.).

The radical route was taken on dechroming, with trim strips, handles, ornaments and other various non-useful goodies being tossed into the scrap heap. And, as a result, there followed hour after hour of hole filling, seam frenching and molding in general.

The bars of a '47 Ford grille were positioned across the frontal opening, and the headlights were frenched, using the late, chrome-lined Ford rims.

Long flairs of sheet metal were shaped and joined to the rear fenders, at the end of which were positioned '47 Ford taillights.

And so it went, Tahitian Red enamel was eventually sprayed over the convert's exterior and a lowering job undertaken which would bring the Canadian custom down to what its owner felt was a respectable level.

And if completion of this one wasn't enough, Don is currently loosing sleep wondering what to do to his next car. And we are wondering with him. ●

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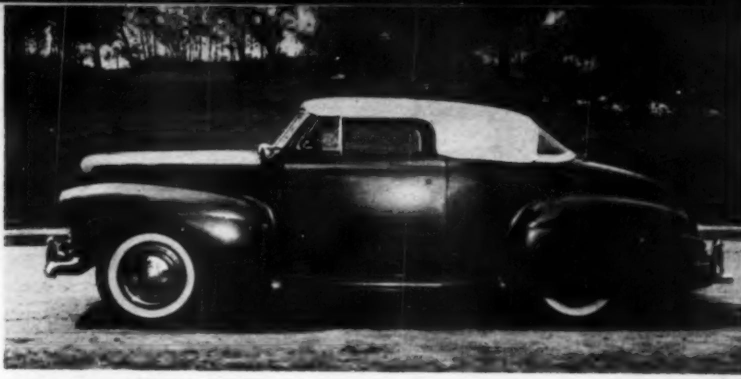
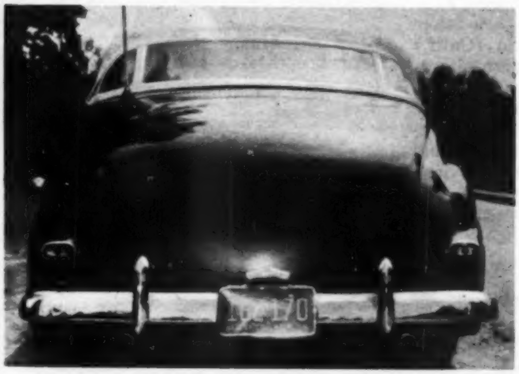
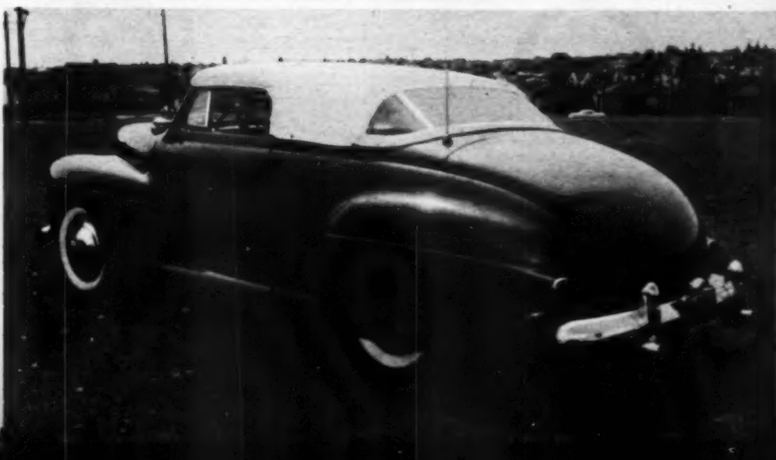


Northern redding, like restyling, follows the course set in this country. Beneath hood the '41 flathead boasts a .060" overbore, port and relieve job. Two '97's sit above Edmunds manifold. Exhaust is through headers into glasspacked mufflers. Doors are opened by switch.



Photos by Hannah



HARRY MUSCIO wanted a beach buggy in the worst way. Warmed to the idea by seeing the famous Arizona Dune Bugs in R & C, then taken for a ride in a Santa Maria (Calif.) Beach Buggy, he began severe alterations to his '50 Ford convertible. But as time and labor were poured into the conversion, he began to fear of subjecting what was turning into a real custom to the trials and tribulations of dune-ing. So the original idea was set aside, and work progressed with this as the end result. ●

Front end is essentially stock except for bull nose chrome strip in place of hood ornament. As foreman of a bodyshop, Harry had access to all the tools that he needed.

Eliminated panel which formerly separated deck lid from cockpit caused body weakness, so new cross-bracing was added just behind the front seat, acts as forward end of bed.

Canvas top is removable as a unit, can be stored out of the way when not in use. Job required 2 months spare time, total financial outlay of $600 over the ragtop's value.

ot for
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Harry
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A PICKUP FOR PLEASURE

1950 Ford convertible was turned into a pickup by elimination of deck lid, rear seat and top mechanism; addition of inner bed panels and the flat flooring of Masonite.

Radiused cutouts for rear wheels and the substitution of '56 Ford side trim mark the extent of customizing other than pickup bed. The hauler's paint job is a blinding white.

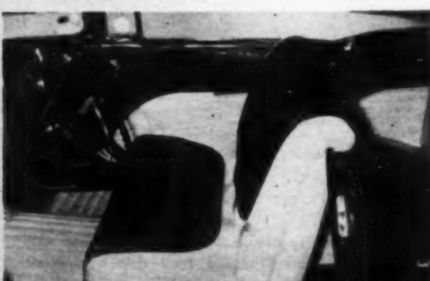
READER'S CAR OF THE MONTH

AN IMPRESSIVE collection of top honor trophy iron has been taken by Roger Kilborn's ebony-hued '55 Chevy. At the many auto shows in which the car has been displayed, it has never been outclassed, earning it a possible title of "The Winningest Hayseed Custom".

Like many another, reader Roger was "going to leave this one alone". And did! – until the very next morning when pipes were installed, the car was lowered and safety belts added.

As time passed, the hardware disappeared. Emblems, including the one on the *steering wheel*, doorhandles and the stock steel side trim were ash-canned. Olds side moldings were positioned for a more graceful appearance. Show time came and Rog went the route. Black and white Naugahyde upholstery was stitched over foam rubber throughout the car. The grille change was made and, just recently, the '56 Packard Clipper tail lenses arrived. Under the hood went the powerplant of a '55 Corvette.

It's good to have Roger's latest efforts on these pages. An earlier effort was selected as the first of our Out Of The 48 reports, and his latest creation proves that R & C alumnus are seldom satisfied "leaving it alone". ●



Photos by Jack Bupp

DIRECTORY

...of articles, feature cars and How-to-do-its in the available back issues of Rod & Custom.

Many of the issues listed are about to become collector's items — the small supply is fast diminishing. Check your past editions and, if you're short a few, better act now.
Send 25¢ for each issue wanted, to Petersen Publications, Back Issue Dept., 5959 Hollywood Blvd., Hollywood 28, Calif.

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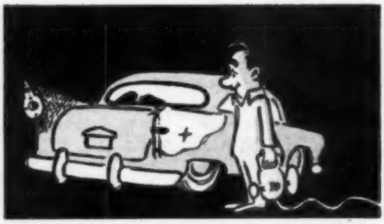
AERODYNAMICS AND SPEED. By Roger Huntington	Dec. '55
RESTYLING THE NEW CONTINENTAL	Dec. '55
PICKED UP FROM OUT OF THE 48. Henning & Ritch tour the U.S.	Dec. '55
OLD RODS NEVER DIE. From track car to street roadster	Dec. '55
SHAKESPEARE AT THE SALT. Was the Great Bard at Bonneville?	Dec. '55
FORD/CHEVY MERGER. Chevy V8 for the '34 Ford	Dec. '55
BLOWING UP A STORM. John Christy solves the problems of forced air induction	March '56
PICKUP WITH A PURPOSE	March '56
DRAG SCIENCE. Part 11 by Roger Huntington	March '56
DEAR GENTLEMAN. Henning and Ritch get mail concerning THE ROADSTER	March '56
PROGRESS REPORT. Enlarging the Rolling Lab's glass area	March '56

(continued on p. 57)

Arin Cee

Way before I started on this article, I contacted several leading glasscloth distributors, so that I could present the best to you readers, and the only one that could prove to me that their product was superior to competitors was Taylor and Art Plastics.



Alright, let's get movin'. STEP ONE: Prepare the surface. This means remove all the paint, dirt and scum. If your glass fails to bond, it means that you haven't prepared the surface thoroughly. Use a disk sander, leave a little 'tooth' for the resin.

STEP TWO: Measure and cut the cloth, this comes before you even start thinking about mixing the stuff. Once you've got all your cloth cut to size, you can start mixing the resin and hardener, you gotta work fast, cause the bloody stuff hardens pretty fast.

STEP THREE: Laying the cloth. If you're using epoxy resin, it's best to wear rubber gloves, some people have tender skin and the mixture might cause a little irritation. If you've got your cloth soaked up, you can start laying it on, TAP recommends that the succeeding layers be layed at right angles to each other.

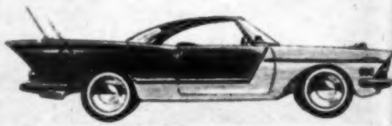
STEP FOUR: Allow the cloth to dry, it'll dry at room temperatures. You will be able to tell when its dried by scraping your fingernail over the surface, if you can't mar it, then you're ready to go ahead and start the sanding bit. Instructions come with the glasscloth kits, but I wanted to try and shed a little light on a dark subject.

off the sketchpad

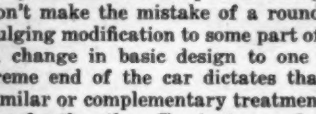
LOOKING AT THE automobile as something other than mere transportation, we find that it may be regarded as a piece of art in motion. The particular appeal of some production models is an indication that the stylists have reached a higher plane of good over-all design than have their competitors. Analyzing the cars which retain their popularity throughout the years and become sought after, even though obsolete with age, we find one common factor applying to all — an absence of the clutter dictated by fashion of their day, and a *balanced* form.

Each model automobile has a certain *character* to it, setting it apart from its brothers. The predominant design lines, for better or for worse, dictate this character. The *lastingly* popular models invariably have their character evenly distributed about the car, not a mumble-jumble of cute gimmicks crowded into one corner.

The same rules that apply to factory items are valid in the proper customizing of *your* car. The original character lines should first be considered. Any alterations which you plan to make should complement them and continue the overall theme, rather than having a deviation in one area which obviously does not fit the basic design. If the lines of your car are crisp and straight, don't make the mistake of a rounded, bulging modification to some part of it. A change in basic design to one extreme end of the car dictates that a similar or complementary treatment is due for the other. For instance, should you decide to shade your headlights in the manner of the day with a long expanse of metal extending the front fender line a half foot or more, the line created throws the forward part of your car out of balance with the rear, and a change should be made to bring 'er back — perhaps by a similar action over the taillights. The angle of the newly created line is most important. It's all too easy to put together some new treatment about the lights, wheel wells, side airscoop or the like, which, by itself is completely graceful, yet falls on its face when a clash is observed by placing it on a car whose prominent design lines are in conflict with it.



Let's stress that balance is *not* achieved by absolute equalism. Harmony, not equality, is the answer in good design. There is no set pattern for achieving harmony, but generally speaking the greater simplicity which can be maintained, the least likely you are to have an unbalanced white elephant on your hands. Let each chrome strip be placed to tie in with the design theme. Have them follow the character lines rather than fight them. Break two-tone color combinations into proper proportions at proper places. A small amount of dark color is the *harmonious* equal of a large light colored area.



In the months to come, we'll take specific problems and show how to overcome them. ●

DIRECTORY continued

FEATURES (Cont.)

HOW-TO-DO-ITS

(continued on page 59)

Conducted by George Burnley

Often, when steam cleaning an engine, it becomes a problem to shield the generator and starter motor from the possible entrance of moisture. To lick this trouble in a simple, inexpensive and practical way, try this:

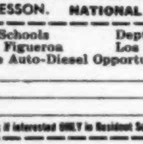
At the nearest dime store buy a few cheap toy balloons. With a pair of shears, cut off the narrow necks. Now stretch the balloon around the generator tightly . . . being careful not to rip the fabric on such things as terminal posts, etc. Presto – done! P.S. Same trick can be used to mask parts while spray painting.

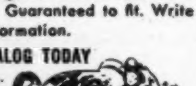
• • • • •

Often during the construction of an automobile it is necessary to make tie rods of various lengths and sizes. It is a nuisance to find bar stock of the size needed, cut it to length and thread it. Hence, by digging into the good old scrap heap a strong, simply constructed tie rod may be easily made as follows: Get a piece of pipe roughly the length needed for the tie rod. Next, find two bolts whose heads will fit snugly into the hollow ends of the pipe. From the pipe, cut off two rings about an inch in length. Then, set the pipe in a vise and make a few saw cuts at each end parallel to the end of the pipe. Finally, slip the bolts into the ends of the pipe and hammer the sawed ends around the bolt shank. To firmly lock the bolts in place, slip the rings of pipe over the bolt, slide on a washer, draw it down with a nut.

• • • • •

From time to time, in electrical testing, it becomes necessary to clip an alligator clamp over a terminal which is covered with a protecting rubber cap – such as a spark plug. To save the time and trouble of removing the rubber cap, procure a few old phonograph needles and braze or silver solder one on each of the alligator clamps so that the point penetrates the rubber while testing. Another electrical testing stunt: Get a short length of radiator hose and fasten it to the front of a strobe light with a hose clamp. Paint it white inside for good reflection. Now the tool is protected if accidentally hit by the fan or other moving part.





HOW-TO-DO-ITS (Cont.)

RODS AND CUSTOMS

OUT OF THE 48

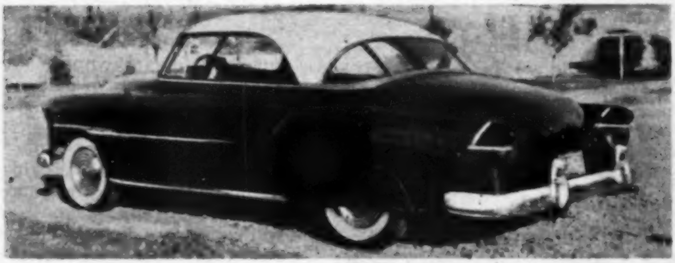
WYOMING

THE CITY OF SHERIDAN is perhaps the least likely spot to go custom car-hunting, but if you *did* happen to stop there, chances are you'd see Dick Rumley happily touring the streets in his sharp looking '52 Plymouth Belvedere.

The hardtop underwent the usual metal modifying route; de-ornamentation of hood and deck, de-handling of the doors. The marriage of an Olds grille bar and a Plymouth shell took place up front with a unique look about it as a happy result.

Even a 2½-inch lowering job didn't bring the car up to completion, even though it was lacquered a brilliant 2-tone red and white, so Dick stuffed beneath the hood the powerplant from a '52 Chrysler. And after a bit of tasteful striping by local artist "Von" Jacobs, the Belvedere had a sufficiently different appearance to make it representative of this great state. ●

MONTANA



LAUREL'S CUSTOM enthusiasts are many, but their rolling stock has not yet begun to grow. However, we're hoping Pat Giblin's restyled '51 Chevy BelAir will start a new trend up Montana way.

Modifications were begun in the usual way; "Just fill the trunk lid". But as the metalmen of the Laurel Paint and Body Shop completed their chore, car-owner Giblin had them commence a similar de-chroming operation up front. Then came the '54 Packard taillights, the '54 Pontiac grille bar, the '55 Chevy headlight doors and blue and white Naugahyde interior.

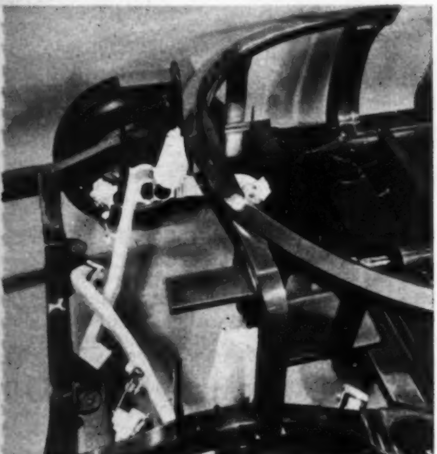
Not until it was painted contrasting blue and white lacquer did Pat decide to call it quits.

If the customizing bug rebites Pat, or any of his restyling cohorts, it is our hope that we'll be the first to publish photos of the customs from this Northern state. ●

AIR SUSPENSION CAN BE A BREEZE

(continued from p. 25)

on this cylinder of oil. Since the oil is incompressible, the motion of the piston (following the up-and-down motion of the wheel) is cushioned by the sealed air chamber through the flexible diaphragm. Obviously the action of this system will be at the mercy of the diaphragm – so it is constructed of a very flexible rubber or synthetic material.



Rear suspension of GM's Firebird II, experimental gas turbine car. Shown is diagonal swing arm suspension, hydraulic leveling valves and the units of the air-oil suspension.

There are two very important advantages to this layout: (1) By dividing the oil chamber in two sections and putting the proper valves and orifices in the dividing wall – so the oil must pass through the valves as the wheel moves up and down – we can incorporate the effect of a *shock absorber* right in the suspension unit. This is also theoretically possible with the previous bellows system, using special air valves, but it wouldn't be a simple problem. Most full compressed air suspensions employ auxiliary hydraulic shocks.

(2) With the air-oil layout we adjust spring deflection (equivalent to changing the ride frequency) by pumping oil in and out of the piston chamber. This varies the pressure in the air chamber by changing the load on the separating diaphragm. The advantage here is that it is generally cheaper and simpler to work with oil than compressed air, mostly because of the elaborate compressor pumps required for handling large volumes of air. Also, what with the recent trend toward central hydraulic systems to provide one source of power to operate the steering, seats, windows, maybe brakes, windshield wipers, fans, etc.; it would be very convenient and inexpensive to include our "ride control" here, too. For these reasons the basic air-oil suspension layout may very well get more attention in the near future in the auto industry than full compressed-air suspension.

One bug: Due to the inevitable friction of the oil piston moving up and down in its cylinder, air-oil suspension will not absorb the tiny road vibrations that an air bellows will, so the overall ride isn't quite as good (though still much better than steel springs). This is the price we have to pay for the convenience of integral shock absorbers and hydraulic ride control.

There are important differences between the Citroen and G.M.-Delco versions of the air-oil suspension unit itself. The Citroen deal is quite a bulky thing; it has the gas chamber in a large bulb at the end of a relatively long oil cylinder. The Delco is much more compact. It has the air chamber in the form of a cylinder, *surrounding* the oil cylinder, with the rubber diaphragm in the form of a sleeve separating the air and oil. The damper valves are in the top of the oil cylinder. The whole package is only 4½" in diameter by 8½" long! In both cases the automatic leveling valves on the chassis work on the very same principle as previously described for the air leveling valves, except they are designed to handle oil under pressure rather than air.

Let me make one thing clear about the action of these "leveling" valves, incidentally: They are *not* intended to keep the body from leaning on a turn. This would require a super-sensitive valve action, very large pumping capacity for either the air or the oil (depending on which basic system is used), and a plumbing layout that would permit almost instantaneous reversal of the flow... otherwise the system couldn't respond quickly enough to keep the body reasonably level. We just don't have this kind of equipment available to us. Maybe someday – but right now we must be satisfied with automatic compensation for varying loads only. To prevent the valves from cutting in or out every time the body tilts going down the road, the mechanism either has a time lag of several seconds built in – or, in the case of the G.M. Firebird system, the valve is inoperative above 10 mph.

So let's sum up briefly the advantages and disadvantages of air (or air-oil) suspension, as it applies to a passenger car, as compared with more conventional steel spring systems:

ADVANTAGES

- Better response to small, high-frequency road vibrations, so an inherently better all-around ride
- Convenient to arrange for automatic control of suspension deflection to maintain constant ride frequency at different loads
- Possible to provide a steep increase in roll stiffness with increasing roll angle, for better stability

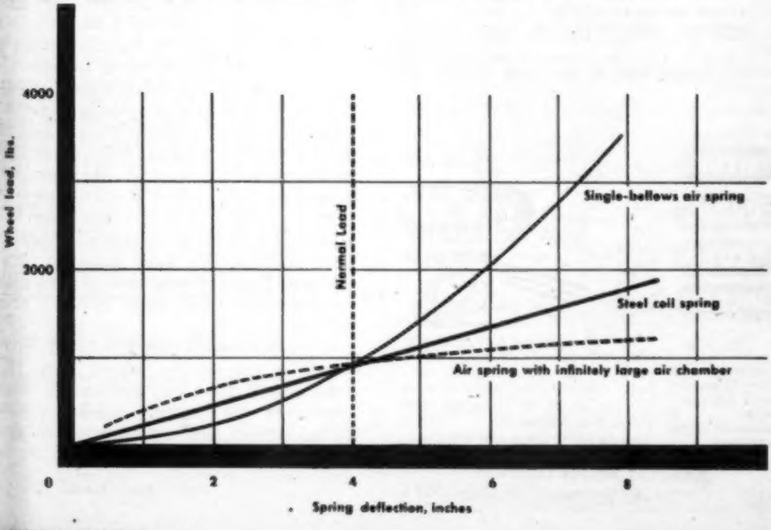
DISADVANTAGES

- More expensive due to need for compressors or oil pumps, accumulators, leveling valves, plumbing, etc.
- More complex mechanically, so more subject to breakdown
- Need for elaborate system of suspension links and arms to control all wheel movement (this latter, however, would make air suspension ideally suited to 4-wheel independent suspension)

Next Month:

R & C's rolling laboratory gives up its springs in favor of air.

An air spring can give a steeply-increasing roll resistance with increasing roll angle if the volume of the air chamber is small compared with wheel travel. A steel spring gives a constant "rate" with wheel travel.



HOPPING UP THE FORD OHV's

(continued from p. 47)

where you are. Of the steps involved in this procedure the most important is to establish top dead center on No. 1 piston. A dial indicator and a degree wheel have to be used. The crank must be turned until the dial indicator shows the piston to be on exact top, then position the degree wheel on the crank and, with a suitable pointer, set at 0° on the degree wheel. Now to check and make sure you have split the approximately 5° of crankshaft movement the piston *does not move* when on top dead center, turn the crank until the piston has moved down into the bore 20 thousands of an inch. Notice how many degrees the crank has moved, then bring the piston back to T.D.C. Now, in the opposite direction of rotation to the one you have just checked, turn the crank until the piston has gone down into the bore 20 thousandths of an inch and again notice the degrees the crank has moved. These two readings should be identical. If not, the difference between the two can be split and the degree wheel should be moved this amount. This procedure has got to be accomplished to the *exact degree* or all other checks after it will be incorrect and you've wasted a lot of time! In this particular engine we have installed a Winfield cam. Ed Winfield utilizes almost 100% split overlap grinds which makes it a comparatively easy job to degree in. We've never found one of Ed's cams misground, even from lobe to lobe or in lift variance. He does such a precise job, I feel it pure folly to install one and hope the cam gear, the chain, the crank gear and keys are as correct. These we have found to be in error at times. These cams set up with an exacting drive train couldn't help but "turn on."

Once you have exact T.D.C. positioned with the degree wheel, turn the crankshaft until you are on top dead center of the overlap stroke, (when both intake and exhaust valve are open an equal amount).

If the cam and gear train are correct both intake and exhaust valves should have identical lift. Two run out gauges positioned on the cam side of the rocker arm as shown in the photograph will give you the lift. It depends on which valve has the highest lift, if they are not identical, as to which way the cam has to be moved. If by rotating the crankshaft *before* top dead center, say 10°, both valve lifts are identical this means the cam is *retarded* 10°. If by the same token it occurs *after* top dead center the cam is *advanced* 10°. The procedure for correction can be done by offsetting the key or by shimming the present key on either side, depending on which way the cam has to turn to be correct. The gear keyway can be filed or machined an amount equal to the shim width. This is normal procedure unless the error is enough to let you move one whole tooth. The amount of the teeth on the crank gear divided into 360° will give you the amount of degrees one tooth would be equivalent to. It is approximately 17°.

Next issue let's find out how it runs and bolt on some more horses. ●

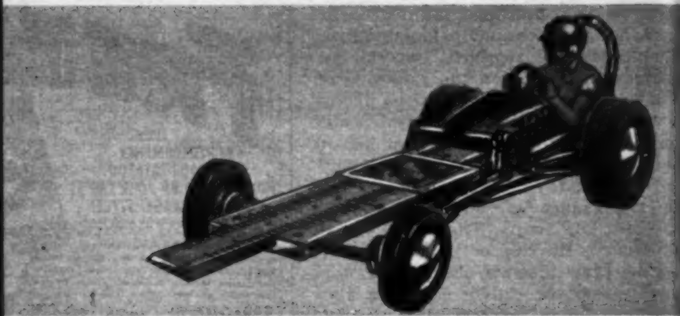
Our step-by-step expert, Les Ritchey has been besieged in the recent months since the advent of his series on Hopping Up the Ford OHV's by rod and custom enthusiasts seeking further information or arranging to have Les place his hands on their engine. For those who would contact author Ritchey, we announce that Les is now in his own new shop, PERFORMANCE Associates, at 1647 E. San Bernardino Road, in Covina, California, where he has complete facilities for all phases of automotive work, including chassis and engine dynamometer testing.

in the april ROD & CUSTOM

In response to reader's requests, the 'Bird gets a blower — and YOU find out the hows and whys.

backpressure

BY ROGER HUNTINGTON, SAE



ONE OF the tougher questions facing the backyard hop-up engineer today is this: Are the various Detroit "sports" and outright racing camshafts a good deal for a highly-modified OHV V-8 engine combination? Will they give the performance you can get from the hot California cams? If not, is the performance boost *per dollar* an attractive proposition?

I'm referring here, of course, to the special factory cams that go in cars like the Chevy Corvette, Plymouth Fury, Dodge 500, Chrysler 300, etc. These are produced in fair numbers, and are priced generally between $20 and $40 over the counter. And then some of the factories – including Chevrolet, Ford, Mercury, Pontiac, Buick, Olds, Dodge, etc.– have very special NASCAR competition cams hidden away. These are ground in much more limited numbers, and are awfully hard to get your hands on.

So where does this iron fit into the overall hop-up picture? I have been fortunate in having access recently to reports on several dynamometer test programs in which some of these Detroit cams were compared directly with some well-known California brands. These results have not been made public, and never will be.

But I *can* say this: There are big, important differences in the various specialty ("California") cams. Some are awfully good – and some are awfully bad. Some don't show any horsepower margin over a production Detroit sports cam, and often their mid-range torque is less. Others will show more than a 10% hp boost, plus a torque increase. Some of these *better* California grinds will even show substantial power and torque margins over the wildest Detroit racing sticks.

There's a reason behind this. Detroit must sharply limit rubbing loads between cam lobes and lifters in order to get long life with inexpensive, mass-produced parts. This means they have to use low valve acceleration rates and get their top-end breathing by long durations. On the other hand, some of the California makers use special chilled iron lifters and costly hardening processes on lobes; with these guys the sky's the limit on valve action. These cam kits may cost over $200 complete (with cam, lifters, springs, etc.), but they will often far out-perform a $150 Detroit racing cam. The more "competitive" California cams – just the cam only, without compatible lifters and springs – will run only $60 to $100. Their valve action is usually much easier, performance may be little above that of a Detroit sports cam, and there is always the chance on *some* that the lifters or lobes will not stand up. You never need worry about this when using Detroit stuff only. ●